Social Entrepreneurship and Disruptive Innovation: Evaluating the use of Rumie's Free Educational Software in Seven Developing Economies

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Abstract: This paper reviews the provision of free educational hardware and software provided by one social enterprise to under resourced children in seven countries. The social and economic challenges faced by this social enterprise are highlighted; the implications for social enterprise of adopting disruptive innovation and of blended learning techniques in an educational context; and the importance of evaluating projects in terms of research methods. Three research questions were posed: what is the educational benefit of using Rumie? [Value dimension]; what criteria can be used to evaluate the use of Rumie in the field? [The capability dimension]; what feedback is there from students, teachers, etc. [The collaboration dimension]. Quantitative usage data and qualitative feedback were collected. Findings show that the tablets help improve pupils math and reading abilities and the educal entertainment does not appear to be at the expense of learning about more traditional subjects. Feedback from teachers and pupils appears to be extremely positive. More specific lessons learned about research methods in evaluating social entrepreneurship projects in developing economies are identified; and implications for adapting the theory of disruptive innovation.

Keywords: Edtech, social enterprise, non-profit, education startup, technological innovation, education, business startups, education industry, Africa

1. Introduction

Unequal access to education impacts one billion children worldwide and leaves them behind in a global economy that is increasingly knowledge-based. Educational materials, ranging from books and lectures to exercises and even interactive games, are shifting to free digital tools. If one has a device and an internet connection, it is possible to learn almost anything for free online. This paper describes and evaluates the work of The Rumie initiative (Rumie 2016), a movement of people working to bring this wealth of free information to underprivileged children worldwide. Implications for social enterprise in developing economies are highlighted with a focus on the use of disruptive technologies; and the importance of evaluating practices to ensure financial and social outcomes are achieved. Since writing this paper, the work of Rumie has also become a Harvard Business School case study (Kim & Migdal, 2016).

2. Background

The Rumie initiative was described as "the world's best social start up" by Global Entrepreneurship Week (2015). Rumie is a non-profit organization on a mission to bring free digital educational content to the world's underprivileged children. The Rumie Initiative has developed an ultra low-cost educational tablet (see image 1.).

Image 1: Rumie tablet showing sample content

This low-cost tablet offers at least three advantages relative to textbooks. First, with a price tag of $50, the Rumie Tablet is much cheaper than a collection of textbooks. Second, updating the online content on a tablet via monthly synchronization with the cloud is much cheaper and easier than purchasing updated versions of textbooks (see image 2).

Image 2: Rumie's LearnCloud

Third, the technological nature of the tablets makes it possible for Rumie to collect analytic data and thus monitor impact automatically and quantitatively – including in offline environments for the first time ever. Rumie's tablets are built so that usage data is captured even while the tablet is not connected to the internet, and is later uploaded to a server when it is.

When developing their business model, the developers of the Rumie Tablet strategically decided to build a device *without* cutting-edge technology. Thus, the Rumie Tablet doesn't have near the functionality of an iPad. And, unlike *One Laptop per Child*, which built a brand new laptop specially engineered for poor communities, Rumie's device has very few new hardware innovations. Instead, it takes advantage of the fact that at this point in the evolution of mobile devices, many of the components in a basic tablet have become commoditized. This allows The Rumie Initiative to assemble its tablets at a much lower cost than the tablets made by other EduTech organizations trying to develop cutting-edge, proprietary designs. As the economics of innovation and commoditization continue to drive down the cost of both content and devices, it will be interesting to see the larger effects that low-cost tablets, such as the Rumie Tablet, could have on education in developing countries. The most powerful innovations for education in the developing world will likely come from blended-learning models that expand the reach and augment the effectiveness of the teaching force. Tablets such as Rumie's device may prove to be important enablers of such blended-learning models.

Thus tablets can be loaded with other free online content—including e-books, digital textbooks, encyclopaedias, quizzes, exercises, and reference materials—that provide educational value far beyond that of the learning materials found in a typical textbook (one device can contain up to 615 digital textbooks).

3. Evaluating the use of Rumie tablets

The usage data that can be automatically collected on a tablet can be used to improve the devices and the content in ways that have never been possible with printed textbooks, even in offline environments. This is significant because it allows Rumie and its partners to automatically obtain quantitative monitoring and evaluation data that proves that the content is being used and that students are progressing through the

materials. The analytics monitor what content is used and at what times down to the specific file; and ties this information to the age, gender and location of the user. Rumie can then obtain insight into what content is valuable and for whom and thus improve its offering over time. This is also the first time that an organization is working to organize free educational content available online by quality. The fact that this analytic feature works in offline environments is extremely significant because it is the first time that quantitative EduTech data is collected through technological innovation in offline environments, even though 4.4 billion people worldwide do not have access to the internet. This technological innovation will allow Rumie to automatically track impact and outcomes in the future through quantifiable, digital big data in real-time.

The analytics feature of the tablets does not nullify the importance of gaining qualitative feedback from students, teachers, parents, government agencies, etc. to show ongoing support for the projects. Thus Rumie operates via local partners who incorporate the use of tablets into programs that they are running on the ground, which takes away the need to build the infrastructure in each location. All partners NGOs are credible local or international educational organizations that are required to provide qualitative feedback to Rumie. The different partners operate in differing local contexts and apply varying pedagogical models to introduce educational technology into the classroom (different devices per student ratios, usage in and out of the classroom, and so on).

4. Academic literature

Disruptive innovation

Arnett (2015) writes that there are roughly one billion children across the world living in poverty—from Malawi to Madagascar to Mongolia—who are non-consumers of the types of education available to children in developed countries. Although the circumstances of non-consumption are unfortunate, they provide ripe prospects for disruptive innovations that can address this lack of access. In recent years, we've seen a number of organizations—including Zaya, Enova, Khan Academy International, and Bridge International Academies—working to develop solutions that address these challenges.

For example, the Clayton Christensen Institute is a non-profit, nonpartisan think tank dedicated to improving the world through disruptive innovation. Founded on the theories of Harvard professor Clayton M. Christensen,[1] the Institute offers a unique framework for understanding many of society's most pressing problems. Their mission is ambitious but clear: work to shape and elevate the conversation surrounding these issues through rigorous research and public outreach. With an initial focus on education and health care, the Christensen Institute is redefining the way policymakers, community leaders, and innovators address the problems of our day by distilling and promoting the transformational power of disruptive innovation. The Christensen Institute is based in the San Francisco Bay Area in California.

In May 2015, the Christensen Institute highlighted Rumie as an example of a disruptive technological innovation.[2] They write about how the true social and economic benefit of Rumie's intervention comes from delivering content to current non-consumers of educational materials, rather than delivering improved content to people already consuming educational materials.

Critique of disruptive innovation theory

On a positive note, a recent article in MIT Sloan Management Review (2015) by King and Baatartogtokh states that: 'few academic management theories have had as much influence in the business world as Clayton M. Christensen's theory of disruptive innovation'. However, the article goes on to conclude that: 'it's essential validity and generalizability have been seldom tested in the academic literature'.

[1] Clay Christensen, a Professor at Harvard Business School, has been at the forefront of management thinking for years (ranked as the #1 management thinker globally in the Thinkers 50 ranking). His first book, The Innovator's Dilemma, published in 1997, explained his theory of "disruptive innovation," and has influenced management thinking and startups for nearly 20 years. Any time you hear the words "disruption" or "disruptive" applied to startups and innovation (technology or otherwise), it almost certainly originated from Christensen's theories.

[2] Arnett, Thomas. "The Economics of Educational Nonconsumption in the Developing World." Clayton Christensen Institute for Disruptive Innovation, 4 May 2015. < http://www.christenseninstitute.org/the-economics-of-educational-nonconsumption-in-the-developing-world>

Four key elements to the theory are identified by King and Baatartogtokh (see figure 1): (1) that incumbents in a market are improving along a trajectory of sustaining innovation, (2) that they overshoot customer needs, (3) that they possess the capability to respond to disruptive threats, and (4) that incumbents end up floundering as a result of the disruption.

In *The Innovator's Solution*, Christensen and Raynor (2003) argue that one of the key elements of disruptive innovation is that "in every market there is a distinctly different trajectory of improvement that innovating companies provide as they introduce new and improved products" p.33. An incumbent business's improvement trajectory results from what they call "sustaining innovation" — "the year-by-year improvements that all good companies grind out." p.34.

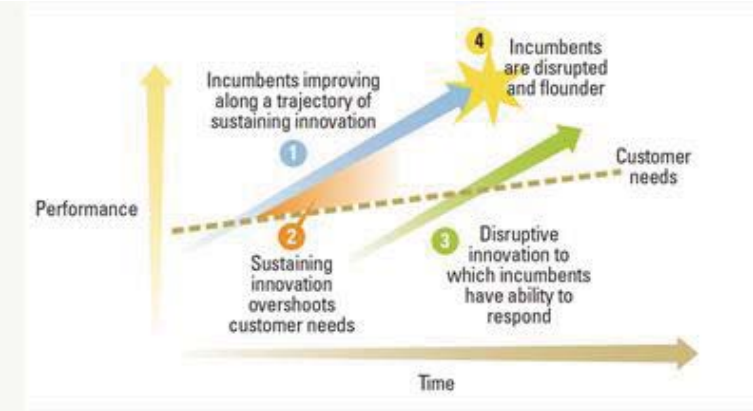

Figure 1: Four elements of the theory of disruptive innovation, King and Baatartogtokh, 2015.

A second element of Christensen and Raynor's theory is that the pace of sustaining innovation along the trajectory of particular value propositions "almost always outstrips the ability of customers in any given tier of the market to use it. … Thus, a company whose products are squarely positioned on mainstream customers' current needs will probably overshoot what those customers are able to utilize in the future." p.33.

Thirdly, Christensen and Raynor claim that incumbent companies frequently possess the capabilities needed to succeed, but managers fail to employ them effectively to combat potential disruptors. "Disruption has a paralyzing effect on industry leaders," they write. "With resource allocation processes designed and perfected to support sustaining innovations, they are constitutionally unable to respond." p.35.

Christensen writes that his original research goal was the development of a "failure framework" for "why and under what circumstances new technologies have caused great firms to fail."(Christensen, 1997 viii). He does not specify the exact probability of failure, but he leaves little doubt it is very high. "Performance oversupply," he writes in *The Innovator's Dilemma*, "opens the door for simpler, less expensive, and more convenient — and almost always disruptive — technologies to enter."(Ibid 213). Companies with these disruptive technologies, he writes, "will always improve their products' performance and in so doing eventually take over the older markets."(Ibid 232). "Once the disruptive product gains a foothold in new or low-end markets," Christensen and Raynor write, "the disruptors are on a path that will ultimately crush the incumbents." (p.234.).

Testing of the theory

King and Baatartogtokh (2015) surveyed and interviewed 79 experts on 77 proposed examples of disruption identified by Christensen and Raynor. For many of the cases, their experts reported historical evidence that corresponded with some elements of the theory. However, in many other interviews, the experts pointed out noteworthy discrepancies between case facts and elements of the theory.

In 24 cases (31% of the total), their experts were skeptical of the existence of any meaningful trajectory of sustaining innovation prior to the emergence of a presumably disruptive innovation (for instance, market retailing before department stores, bazaars before eBay, and four-year colleges before community colleges). In 60 cases (78% of the total), and contrary to the expectations of the theory, their experts thought that incumbent companies were not producing, or likely to produce, products or services that exceeded customer needs. In 30 cases (39% of the total) their experts disputed Christensen's contention that incumbent businesses were capable

of responding to the disruptive innovation. In about 62% of the cases, incumbents floundered as a result of a disruptive competitor. However, in the remaining 29 cases (38%), there were a range of outcomes.

In summary, although Christensen and Raynor selected the 77 cases as examples of the theory of disruptive innovation, the King and Baatartogtokh study reveals that many of the cases do not correspond closely with the theory. In fact, King and Baatartogtokh suggest that only seven of the cases (9%) contained all four elements of the theory. In conclusion, King and Baatartogtokh do not advocate discarding the theory of disruption but that the theory does provide a generally useful warning about managerial myopia. The theory thus serves as a useful reminder of the importance of testing assumptions, seeking outside information, and other means of reducing myopic thinking.

Implications for the educational industry

The first implication of disruptive theory for the education sector is that it needs to continually innovate with the use of EduTech. [Value dimension]. The second implication for the education sector is that it needs to be constantly aware of the different cultural contexts in which EduTech can be used e.g. developing economies, pace of societal change, poor infrastructure, local knowledge. [Capability dimension]. The third implication for the education sector is that it needs to have effective working relationships with those working in the field. This includes agencies, schools, teachers, parents, etc.[Collaboration dimension]. The fourth implication is that the Rumie Initiative should carefully roll-out it's tablets and eduware in such a way that traditional education providers do not see the initiative as a threat to their existing teaching and modes of operation.[All dimensions].

Table 1 has been drawn up by the author of this paper to highlight the findings of the above study and identify implications for the education sector in general and the Rumie initiative in particular.

Table 1: Application of the theory to industry in general and the education sector in particular

Elements of Theory (Christensen and Raynor)	**Implications for industry in general (King and Baatartogtokh)**	**Implications for education industry in general (Moon)**	**Implications for the Rumie Initiative in particular (Moon)**
Relative Rates of Improvement and Utilization	Calculate the value of winning.	Value disruptive education in its own right but adopt metrics on use and output to prove value vis-a-vis mainstream education	Ensure benchmark data is taken in situ to prove value of technology on educational grounds
Relative Rates of Improvement of Sustaining and Disruptive Technologies	Leverage existing capabilities.	Leveraging off existing 'universal' content (e.g. 3 R's) but use technology to innovate on both content and process	Develop bespoke content based on field understanding of user needs e.g. local curriculum
Incumbents' Ability to Respond	Work collaboratively with other companies.	Collaborate with agents in the field for distribution; collaborate with existing educational providers on content	Need to maintain field relationships with school i.e. Head, teachers, pupils, to ensure benefits are realised and performance data gleaned
Managers Satisfying Existing Customers		Work with teachers in the field to support their use of the technology; and understand the context. Work with agents to develop bespoke eduware.	Time is needed in the field to see how the tablets are used in practice; teachers could feel isolated if not involved in the process; teachers might not actively support if feel role is undermined by the new technology. Work with teachers to co-design bespoke eduware

Thus, the Rumie initiative has been considered as an example of disruptive innovation. However, the education sector is not generally regarded as consisting of *for-profit business*; and when the theory speaks of 'crushing the incumbents' this does not readily apply to a not-for-profit sector that relies on multi-stakeholder collaboration. Table 1 is designed to consider how the theory of disruptive innovation can most usefully be applied in the context of education. By focussing on one example of disruptive technology i.e. the use of Rumie tablets in developing countries, this paper attempts to show how the theory can be applied in practice and what implications there are for the further 'roll-out' of such eduware.

For example, education can be regarded in one sense as a universal panacea and there is the risk that eduware, pre-loaded onto tablets, is also thought of by external agents as the answer to all manner of social problems. This paper thus highlights the significance of effective monitoring to identify the benefits; but also to understand the unique context in order that important operational issues are not ignored. For example, the theory suggests that value is highlighted (to all parties), that existing capabilities in the field are built upon, and that collaboration is important. What does this mean in practice?

5. Background to projects in seven developing economies

Haiti

Haiti is the poorest country in the Americas, so it's not surprising they have a very weak education system: 50% of children do not attend school, and of the ones that do 80% go to private institutions. Despite these hurdles, Haitian families care about sending their kids to school, spending about 15% of their income on each child's education. But schools are scarce, especially in rural regions, meaning that children have to be old enough just to make the long journey required to start learning. When children finally get to school, teachers are poorly trained and students have to share out-of-date textbooks with many peers. These circumstances translate to poor test scores and many dropouts. Rumie devices not only make educational materials affordable for children, they also encourage out-of-class independent learning – a promising solution for a country full of kids enthusiastic to learn.

The Gambia

In the last two decades the Gambian government has made strides towards improving access to education: during the late 90s government focus and expenditure on education increased dramatically, with primary education being made free in 1998. However, due to limited resources and inability to pass examinations, only 57% of Gambian children continue their education past age 13. This lack of continued, meaningful education is a significant reason that about a third of the population lives below the international poverty line. Major challenges stand in the way of improving the quality of each student's education. As only 14% of Gambians have access to the internet, they cannot gain from the vast trove of free learning resources available online. There is a huge need for Rumie to bring these resources to their offline population. Rumie is working with CSR Global, a UK-based organization, along with The Well-being foundation, Middlesex University, to deliver tablets to a Gambian senior school. Students are using the tablets to learn English, math, science and to access information about careers and post-school planning. The target age for this group are young people aged 14 plus who have returned to school to complete their secondary education.

Liberia

Liberia, in West Africa, was the country worst hit by the region's 2014 Ebola epidemic. Since the end of its second civil war in 2003, Liberia has struggled to rebuild its educational system to serve not only children, but also former child soldiers that never received any formal education. In Summer 2014, Rumie delivered tablets to Monrovia to help educate and engage former child soldiers in a rehabilitation program. Rumie's tablets arrived in Monrovia just before the borders were closed and the program postponed. Amazingly, Rumie's devices ended up serving a different (and just as useful) purpose than the one originally intended. With schools closed to prevent the spread of Ebola, students were confined to their homes. As kids in developing countries geared up to go back to school, kids in Liberia were told to stay away – with no idea when it would be safe to leave the house. Because the originally intended program was suspended, the program leader for the Rumie rollout distributed the devices to local children as a way for them to continue learning and have something to do, even while confined to their homes. After seeing how successfully Rumie Tablets engaged and motivated kids in his

community, we decided to run Education Over Ebola, a crowdfunding campaign to expand the program. Our supporters helped us reach 250% of our goal, funding over 500 more tablets to send to Liberia.

Uganda

Until the early '90s, Uganda's political conflicts kept many people from going to school. Since then, school enrolment has grown from 60 to 90%. Even though this statistic makes it look like the education system in Uganda has been 'fixed', these improvements are uneven in different parts of the country. Students at primary schools face high student-to-teacher ratios and poor teaching methods, which keep them from finding school worthwhile. Many schools in poor communities don't even have classrooms and have to teach lessons outside. In 2013, UK's Department for International Development (DfID) launched a 'Girls' Education Challenge' to help NGOs improve girls' education. PEAS, a UK organization that builds and runs schools in Africa, met this challenge by planning an Autonomous Learning Project that would see hundreds of girls using Rumie Tablets to take a more independent approach to learning.

Tanzania

Tanzanians care deeply about providing universal education to their children: in 2002 primary schooling was made free and compulsory, and in 2007 secondary school became mandatory for qualified students. However, poorer families cannot pay the extra but necessary school fees for uniforms, exams, and school supplies. This means that their children cannot actually go to school. Villages must pay to maintain their primary schools, but can very rarely afford to. Also secondary schools are scarce, which means that they are overcrowded and lacking in resources. There is a huge demand for alternative low-cost learning resources, which would be hugely impactful on a population that already values education. Rumie has supplied tablets to a secondary school in rural Tanzania. The results have been so positive that the partner is already keen to order more!

Rwanda

Rwanda is still recovering from the 1994 genocide that destroyed the educational system. And the government's decision in 2008 to change the official language for education from French to English left many teachers inadequately prepared. Encouragingly, the government has shown a willingness to take innovative approaches to education. However, the country still needs to improve its educational framework: Rwanda currently faces an extremely low school retention rate of 52%, showing that many students and their families don't find going to school worthwhile or affordable. In 2014, Rumie and Right to Play started a project that saw teachers in Rwanda using tablets both inside and outside the classroom, giving them access to many more resources than was possible before.

South Africa

South Africa spends a larger portion of its GDP on education than any other African country and has abolished school fees in the poorest parts of the country; presumably making school relatively accessible for children from low-income families. However, student test scores are lower than they are in most nearby countries. UNICEF identifies the reasons for this as irregular attendance, absent teachers, teenage pregnancy, and school-related violence. Many public schools in South Africa don't have running water, and the majority don't have libraries or computers. Teacher volunteers from the US Peace Corps have established a program with Rumie Tablets at a middle school in a rural South African village. The tablets have many purposes, including their use to undertake research, write English essays, and provide after-school activities like chess. This deployment is giving students access to digital library materials and technology experience that will help them find jobs in the future.

6. Research questions

- Quantitative question a: What is the educational benefit of using Rumie? [Value dimension].
- Quantitative question b: What criteria can be used to evaluate the use of Rumie in the field? [The capability dimension].
- Qualitative questions c: What feedback is there from students, teachers, parents, schools, government agencies, etc. [The collaboration dimension].

7. Findings

Quantitative results

The sample of usage statistics from an unnamed deployment in Figure 2 shows an initial rapid uptake in time spent by pupils with tools such as calculator and dictionary; and more time spent with the book readers and video players than with the educal entertainment (Rumie reward for learning). In terms of subjects addressed: initial time spent on Maths appears to give way over time to English Grammar, World History and Earth Science. These findings are likely to be influenced by teachers and pupils becoming more familiar with tablet content; and to some extent by lesson planning for the week in question. However, the snapshot does show the power of the data analytics to observe trends over time.

Qualitative results

The qualitative data across seven countries in Tables 2 and 3 provides an indication of certain trends across the board (6 months):

- Teachers observe that students are showing improvements in math and reading abilities - in most cases partners report that this is because tablets have significantly improved basic student access to educational materials (otherwise in limited supply);
- Student engagement and enthusiasm is significantly improved when using a digital tool, partly due to its interactive capabilities;
- The use of a digital tool early in life boosts confidence and digital literacy and comfort (one partner suggests that it also generates new interest in technology and engineering subjects);
- Partner NGOs, some of which have conducted internal studies, see one device as having far more impact than one student (ranging from 5-10 in most cases to as many as 750 in one case).

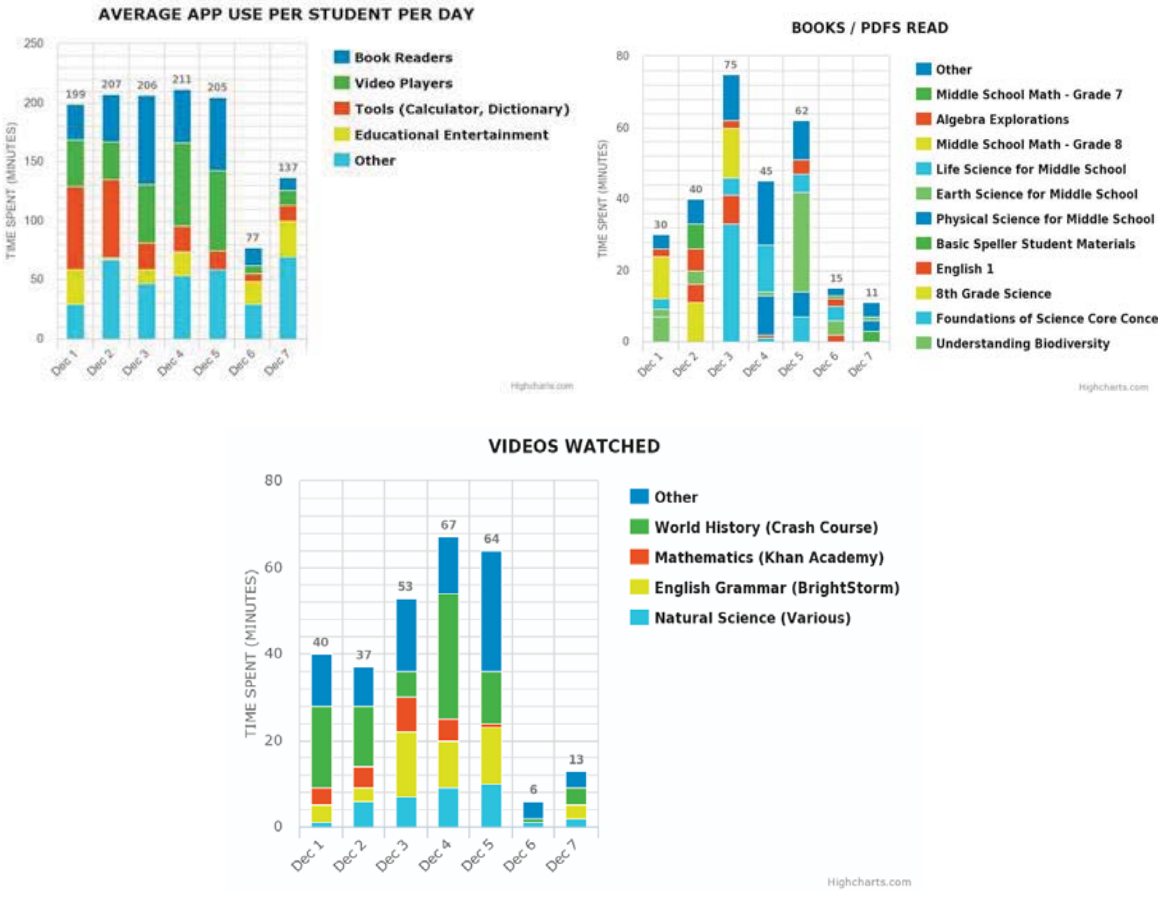

Figure 2: Snapshot Rumie tablet usage by pupils in one deployment over seven days.

Table 2: Summary qualitative findings on five criteria

Project	Increased efficiency of teacher planning	Increased range of activities teachers could lead	Increased participation of children	Increased participation of parents	Educational software improved teachers' ability to teach effectively
Haiti	No	Yes	Yes	N/A (orphanage)	Some areas
The Gambia	No	Yes	Yes	No	Some areas
Liberia	Yes	Yes	Yes	Yes	Some areas
Uganda	Yes	Yes	No (n/a)	No (n/a)	Yes
Tanzania	Yes	Yes	Yes	Unknown	Yes
Rwanda	Yes	Yes	Yes	Yes	Yes
South Africa	No	Yes	Yes	Unknown	Yes

Table 3: Sample qualitative feedback on Rumie use in seven countries.

Project	Increased efficiency of teacher planning	Increased range of activities teachers could lead	Increased participation of children	Increased participation of parents	Educational software improved teachers' ability to teach effectively
Haiti	n/a	Tablets helped occupy some kids with practice questions while teachers could give focused extra help to peers.	Children are excited to learn on the tablet and want to learn everything on it	n/a	The tablets help us motivate kids with math and English games and with reading together
The Gambia	We can use this to point students in the right direction. We also need to add our curriculum to the tablet	If we had more tablets we could use these to support our teaching	I wish I could take the tablet home. It is very good for me to learn and it has things we do not study in class		The tablet gives children time to understand things in their own way
Liberia	Teachers have tools available that explain difficult concepts well. Also makes it possible to reward students for learning with educational games	Teachers were able to combine traditional teaching with practice games, more practice questions, and independent study while answering other students' questions.	Rumie Tablets encourage children who weren't in school to re-enrol in school. They encourage kids to teach each other things and read independently, even students who never liked reading before.	Parents/older siblings lead students in doing reading and other exercises when tablets are brought home.	Teachers are more prepared with concepts because they have access to materials. It also allows for some students to study or practice independently while the teacher gives focused attention to students who don't understand.
Uganda	It was noted that tablets were very useful in lesson planning and delivery.	The math and literacy games were found to be of use particularly in supporting literacy and numeracy	n/a	n/a	All the content was usable by teachers, who said that each class was catered for and content was in line with curriculum requirements.

Project	Increased efficiency of teacher planning	Increased range of activities teachers could lead	Increased participation of children	Increased participation of parents	Educational software improved teachers' ability to teach effectively
		improvement in schools.			
Tanzania	n/a	n/a	n/a	n/a	n/a
Rwanda	The tablets proved very useful to teachers and students, facilitating games and activities, in and out of the classroom.	The easy access to content enabled teachers to implement activities that they had not previously implemented.	Teachers found that tablets ensured efficiency and increased participation from the children.	Parents were able to see what their kids were doing while at school, which made them more involved. Teachers used this to raise parental awareness on child protection and the need for children's participation in leadership activities.	In absence of other reference sources to develop English grammar lessons, teachers used the grammar applications on the tablet to develop lesson content.
South Africa	Tablets gave teachers examples for lessons to use in class. They gave them tools to make teaching easier (i.e. dictionary, music tuner, encyclopaedia).	Teachers had more resources they could incorporate into lessons and use to help students learn.	Children were more motivated to read than ever before.	n/a	Teachers had more sources of information to reference in their teaching, and more examples to use to explain a concept.

8. Discussion

Five criteria were used to evaluate feedback. However, educational provision, cultural mores and teacher styles inevitably vary considerably across the sample countries and projects. For example, in some cases teachers allowed students to take tablets home; boys and girls might be taught in separate classrooms; the number of tablets provided was not the same for each school. This makes cross comparison difficult. Nevertheless, the criteria are useful for ascertaining general points about the use of Rumie tablets. And reliance solely on usage statistics would only paint a partial picture of the provision.

9. Conclusions

Value dimension: The Rumie tablets have the capacity for storing the equivalent of 615 text books. Preliminary usage data reveals that pupils are exploring a broad range of eduware content; and accessing the educal entertainment does not appear to be at the expense of more traditional subjects such as Maths, English and Science.

Capability: The tentative conclusion is that the tablets help improve pupils math and reading abilities. However, this finding will need to be more carefully evaluated with performance in existing regional or national tests. And due to variance in operational practices caution will need to be exercised when comparing the results from different schools and countries. For example, there is freedom for individual teachers to use the tablets in any way they want.

Collaboration dimension: Feedback from teachers and pupils appears to be extremely positive. The joy on the faces of pupils accessing the tablets for the first time is self-evident (see figure 3). This feedback extends beyond

the novelty factor i.e. anything new can realise a change in behaviour ('Hawthorne effect'). However, the model to distribute tablets to pupils relies on agents operating in the field and thus a great deal depends on how teachers are involved in this process, and support from head teachers, etc.

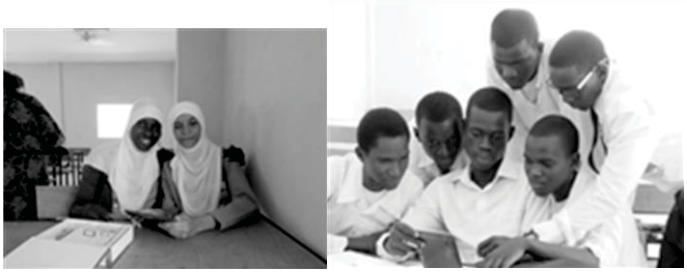

Figure 3: Students receiving and working with their Rumie tablets

The model appears to by-pass the need for central government support. However, there is a heavy reliance on field agents to ensure that teachers are adequately guided in how to use the eduware with pupils; and to ensure that usage results are collected via the internet on a regular basis.

More specific lessons learned about research methods in evaluating social entrepreneurship projects in developing economies are as follows:

- Even for projects involving 'disruptive innovation' it is important to consider how to effectively monitor and evaluate projects to ensure that social enterprises can demonstrate the effectiveness of their provision to funders, other agencies, and the general public.
- It is important to provide a consistent methodology to evaluate projects across countries and schools. This needs to be designed into the provision of tablets at the outset.
- Schools and teachers need standardised briefing in order that projects are evaluated effectively.
- There needs to be a good balance between quantitative and qualitative feedback in order that aggregate statistics make sense; and diversity of provision is captured.
- For social enterprises with limited resources it is important to have good relations with partner institutions whom inevitably take much of the burden of monitoring and evaluation.
- It is not simply enough to provide hardware (tablets) and software (educational materials and games) to ensure the success of projects. Provision of such tablets needs to be integrated with existing educational provision so that effective 'blended' learning is supported.

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